What is claimed is:

1. In a method for operating an olefin production plant that employs a pyrolysis furnace to severely thermally crack hydrocarbon materials for the subsequent processing of said cracked materials in said plant, said furnace having in its interior a convection heating section and a separate radiant heating section, said radiant heating section being employed for said severe cracking, the improvement comprising providing whole crude oil as the primary feedstock to said furnace, preheating said feedstock to a temperature of from about 500°F to about 750°F to form a mixture of vaporous and liquid hydrocarbons, collecting said mixture in a vaporization/mild cracking unit, in said unit separating said vaporous hydrocarbons from said liquid hydrocarbons, passing said vaporous hydrocarbons to said radiant heating section, retaining said liquid hydrocarbons in said unit, introducing at least one heated gas into said unit to mix with said liquid hydrocarbons in said unit to dilute said liquid hydrocarbons and heat same to a temperature of from about 800°F to about 1,300°F to form additional vaporous hydrocarbons, removing said additional vaporous hydrocarbons to said radiant heating section, removing at least part of said liquid hydrocarbons from said unit and passing same through at least one controlled cavitation device to at least one of vaporize and mildly crack at least part of said removed liquid hydrocarbons thereby forming an additional liquid/vapor mixture in said at least one cavitation device, and returning said additional mixture to said unit.
2. The method of claim 1 wherein said whole crude oil feed is mixed with steam at least one of before and during said preheating.
3. The method of claim 1 wherein said preheating is carried out in said convection heating section.
4. The method of claim 1 wherein essentially all vaporous hydrocarbons are separated from said liquid hydrocarbons so that primarily only

hydrocarbon liquid retained in said unit is subjected to both higher heated gas to liquid hydrocarbon ratios and higher heated gas temperatures to cause additional vaporization of said liquid hydrocarbons.

5. The method of claim 1 wherein said heated gas is introduced into said unit at a gas/hydrocarbon dilution ratio of from about 0.3/1 to about 5/1.

6. The method of claim 1 wherein said heated gas is introduced into said unit at a temperature of from about 1,000°F to about 1,300°F.

7. The method of claim 1 wherein said heated gas is at least one of steam and hydrogen.

8. The method of claim 1 wherein said unit is employed in the interior of said convection heating section, and said device is employed on the exterior of said convection heating section in fluid communication with said unit.

9. The method of claim 1 wherein said unit and said device are both employed outside said furnace but in fluid communication with the interior of said furnace.

10. The method of claim 9 wherein said unit is in fluid communication between said convection heating section and said radiant heating section.

11. The method of claim 1 wherein the retention of liquid hydrocarbons in said unit and said device is continued until a significant portion of said liquid hydrocarbons are converted to vaporous hydrocarbons by at last one of vaporization and mild thermal cracking and removed from said unit and device to said radiant heating section.

12. The method of claim 1 wherein said whole crude oil stream is straight run crude oil that has not been subjected to any distillation, fractionation and the like prior to its introduction into said furnace.

13. The method of claim 4 wherein, in addition to said additional vaporization, at least a portion of said retained liquid hydrocarbons in said unit when encountering said higher gas/liquid hydrocarbon ratios and higher gas temperatures undergoes mild thermal cracking to reduce the molecular

weight of at least some of said retained liquid hydrocarbons thereby facilitating the vaporization of same and effecting good utilization of said feed stock as a source of vaporous hydrocarbon feed for said radiant section.

14. The method of claim 1 wherein said device is operated under controlled cavitation conditions such that the liquid in said device is exposed in localized areas to a temperature of at least about 800°F.

15. The method of claim 1 wherein at least one heated gas is introduced into said device to facilitate thermal cracking of liquid therein and enhance vaporization of liquid therein.

16. The method of claim 1 wherein said cavitation device employs a degree of cavitation of at least 0.1.